International Journal of

HYDROGEN ENERGY

Editor-in-Chief
T. NEJAT VEZIROĞLU

Associate Editor
J. W. SHEFFIELD

Editorial Board
H. K. ABDEL-AAL, L. A. AVACA, P. AZOU, F. BARBIR, G. BEGHI, R. E. BILLINGS, D. L. BLOCK, J. O'M. BOCKRIS, R. H. CARTY, W. J. D. ESCHER, J. E. FUNK, D. P. GREGORY, H. P. HARRENSTEIN, S. KAKAÇ, K. F. KNOCHE, S. P. MALYSHENKO, C. MARCHETTI, A. R. MARTINEZ, T. OHTA, J. POTTIER, A. N. PROTSENKO, M. V. C. SASTRI, G. D. SAUTER, D. S. SCOTT, W. SEIFRITZ, P. K. TAKAHASHI, B. J. TAYLOR, H. VANDENBORRE, W. D. VAN VORST, A. K. VIJH, C.-J. WINTER, Y. ZHU

Volume 21, 1996

Volume Contents and Author Index

PERGAMON

International Journal of
HYDROGEN ENERGY

Official Journal of the International Association for Hydrogen Energy

P.O. Box 248266, Coral Gables, FL 33124, U.S.A.

EDITOR-IN-CHIEF: T. NEJAT VEZIROĞLU, College of Engineering, University of Miami, Coral Gables, FL 33124, U.S.A.

ASSOCIATE EDITOR: JOHN W. SHEFFIELD, Mechanical and Aerospace Engineering Department, 207 ME Bldg, University of Missouri-Rolla, Rolla, MO 65401, U.S.A.

NEWS EDITOR: H. ROGER HINDS, 1168 Lindberg Avenue, S. Lake Tahoe, CA 96150, U.S.A.

LEGAL COUNSELOR: MELVIN C. MORGENSTERN, Semet, Lickstein, Morgenstern & Berger, P.A., 201 Alhambra Circle, Coral Gables, FL 33134, U.S.A.

SECRETARY-TREASURER: BENGI VEZIROĞLU, International Association for Hydrogen Energy, P.O. Box 248266, Coral Gables, FL 33124, U.S.A.

Change of address/Airmail delivery/Membership lists

1. IAHE members changing their address should write to: IAHE Co-ordinator, P.O. Box 248266, Coral Gables, FL 33124, U.S.A. Other subscribers changing their address should write to the Publisher at the address below.

2. Members and subscribers in Europe, North America and Japan receive their copies by air at no extra charge. Your journal can be posted by airmail to other parts of the world and details of airmail postal rates can be obtained from the address below.

3. The IAHE membership list can be purchased from the Publisher at £82.00 ($132.00) per 1000 addresses. Enquiries on the above should be sent to: Mr B. Smith, Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, U.K.

Production Editor: Jackie Bannister [*e-mail*: j.bannister@elsevier.co.uk].

Publishing and Advertising Offices: North America: Elsevier Science Inc., 660 White Plains Road, Tarrytown, NY 10591-5153, U.S.A. [*Tel.*: (914) 524 9200; *Fax*: (914) 333 2444]. Rest of the World: Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, U.K. [*Tel.*: (01865) 843000; *Fax*: (01865) 843010].

Annual Institutional Subscription Rates 1997: Europe, The CIS and Japan 1893 Dutch Guilders. All other countries US$1168. Associated Personal Subscription Rates are available on request for those whose institutions are library subscribers. Dutch Guilder prices exclude VAT. Non-VAT registered customers in the European Community will be charged the appropriate VAT in addition to the price listed. Prices listed include postage and insurance and are subject to change without notice.

Any enquiry relating to subscriptions should be sent to:

The Americas: Elsevier Science Customer Support Department, P.O. Box 945, New York, NY 10010, U.S.A. [Tel: (+1) 212-633-3730/1-888 4ES-INFO. Fax: (+1) 212-633-3680. E-mail: usinfo-f@elsevier.com].

Japan: Elsevier Science Customer Support Department, 9-15 Higashi-Azabu 1-chome, Minato-ku, Tokyo 106, Japan [Tel: (+3) 5561-5033. Fax: (+3) 5561-5047. E-mail: kyf04035@niftyserve.or.jp].

Asia Pacific (*excluding Japan*): Elsevier Science (Singapore) Pte Ltd, No. 1 Temasek Avenue, 17-01 Millenia Tower, Singapore 039192 [Tel: (+65) 434-3727. Fax: (+65) 337-2230. E-mail: asiainfo@elsevier.com.sg].

Rest of the World: Elsevier Science Customer Service Department, P.O. Box 211, 1001 AE Amsterdam, The Netherlands [Tel: (+31) 20-485-3757. Fax: (+31) 20-485-3432. E-mail: nlinfo-f@elsevier.nl].

Back issues of all previously published volumes are available direct from Elsevier Science Offices (Oxford and New York). Complete volumes and single issues can be purchased for 1991–1995. Earlier issues are available in high quality photo-duplicated copies as complete volumes only.

Periodicals postage paid at Newark, New Jersey and additional entry points. *International Journal of Hydrogen Energy* (ISSN 0360–3199) is published **12 issues per year in January, February, March, April, May, June, July, August, September, October, November and December**, by Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, U.K. The annual subscription in the U.S.A. is **$1168**. *International Journal of Hydrogen Energy* is distributed by Mercury Airfreight International Ltd, 10 Camptown Road, Irvington, NJ 07111-1105, U.S.A. Postmaster: Please send address corrections to *International Journal of Hydrogen Energy*, c/o Elsevier Science Regional Sales Office, Customer Support Department, 655 Avenue of the Americas, New York, NY 10010, U.S.A.

CONTENTS TO VOLUME 21

NUMBER 1

	1	Acknowledgement of Reviewers
D. S. SCOTT	7	The gods of EPF
K. VASUDEVA, N. MITRA, P. UMASANKAR and S. C. DHINGRA	13	Steam reforming of ethanol for hydrogen production: thermodynamic analysis
G. C. DE, A. M. ROY and S. S. BHATTACHARYA	19	Effect of *n*-Si on the photocatalytic production of hydrogen by Pt-loaded CdS and CdS/ZnS catalyst
A. KHALIDI, B. LAFAGE, P. TAXIL, G. GAVE, M. J. CLIFTON and P. CÉZAC	25	Electrolyte and water transfer through the porous electrodes of an immobilised-alkali hydrogen–oxygen fuel cell
MING AU, CHANGPIN CHEN, ZHOU YE, TIANSHUI FANG, JING WU and OIDONG WANG	33	The recovery, purification, storage and transport of hydrogen separated from industrial purge gas by means of mobile hydride containers
J. W. BUCKEL and S. CHANDRA	39	Hot wire ignition of hydrogen–oxygen mixtures
T. KRATZEL, A. BURKHARDT, H. EICHERT and M. FISCHER	45	Instationary highly turbulent hydrogen tube combustion processes in obstacle areas
D. STASCHEWSKI	53	Traction data acquisition and analysis with a hydrogen fuel cell truck driven on public roads
Book Reviews		
M. V. C. SASTRI	65	*Energy and Exergy Currents (An Introduction to Exergonomics).* By E. I. Yantovskii
P. H. ABELSON	66	*Renewable Energy from the Ocean. A Guide to OTEC.* By W. H. Avery and Chih Wu
M. J. HIGATSBERGER	67	*Information, Entropy and Progress.* By R. U. Ayers
M. S. CELIK	68	*Coal: Resources, Properties, Utilization, Pollution.* Edited by O. Kural
	69	Calendar
Announcements	71	*HYDROGEN ENERGY PROGRESS X,* Proceedings 10th World Hydrogen Energy Conference, Cocoa Beach, Florida, U.S.A., 20–24 June 1994
	72	*The Second International Conference on New Energy Systems and Conversions,* Proceedings
	73	National Hydrogen Association, The 7th Annual U.S. Hydrogen Meeting, Alexandria, VA, U.S.A., 2–4 April 1996
	74	Energex '96. The Sixth International Energy Conference and Exposition, Beijing, China, 3–7 June 1996

76 Harvard University 1996 Training Workshop on Environmental Economics and Policy Analysis, Cambridge, Massachusetts, U.S.A., 10 June–12 July 1996

77 First Trabzon International Energy and Environment Symposium (TIEES-96), Karadeniz Technical University, Trabzon, Turkey, 29–31 July 1996

78 International Symposium on Metal Hydrogen Systems, Fundamentals and Applications, Les Diablerets, Switzerland, 25–30 August 1996

79 International Association for Hydrogen Energy

NUMBER 2

T. C. WOODBRIDGE and D. D. WOODBRIDGE 81 Ocean hydrogen for launch operations

P. MILLET, F. ANDOLFATTO and R. DURAND 87 Design and performance of a solid polymer electrolyte water electrolyzer

N. N. RAO and S. DUBE 95 Photoelectrochemical generation of hydrogen using organic pollutants in water as sacrificial electron donors

M. SUBRAHMANYAM, V. T. SUPRIYA and P. RAM REDDY 99 Photocatalytic H_2 production with CdS-based catalysts from a sulphide/sulphite substrate: an effort to develop MgO-supported catalysts

A. K. KASHYAP, K. D. PANDEY and S. SARKAR 107 Enhanced hydrogen photoproduction by non-heterocystous cyanobacterium *Plectonema boryanum*

B. K. SINGH, A. K. SINGH and O. N. SRIVASTAVA 111 Improved hydrogen sorption characteristics in $FeTi_{1-x}Mm$ material

R. BALASUBRAMANIAM 119 The role of interfacial curvature in the hysteresis in metal–hydrogen systems

M. IPPOMMATSU, H. SASAKI and S. OTOSHI 129 Evaluation of the cost performance of the SOFC cell in the market

Short Communications

J. ROTHSTEIN 137 Hydrogen, the inherently recyclable fuel

W. SEIFRITZ 139 Optimum location of electric power stations with CO_2-disposal

H. R. HINDS 141 Hydrogen Energy News and Views

145 Calendar

147 Hydrogen Energy and Energy Related Publications

Announcements 155 *Hydrogen Energy Progress X,* Proceedings 10th World Hydrogen Energy Conference, Cocoa Beach, Florida, U.S.A., 20–24 June 1994

156 *New Materials for Fuel Cell Systems I.* Proceedings of the First International Symposium on New Materials for Fuel Cell Systems, Montreal, Quebec, Canada, 9–13 July 1995

157 National Hydrogen Association, The 7th Annual U.S. Hydrogen Meeting, Alexandria, VA, U.S.A., 2–4 April 1996

158 First Trabzon International Energy and Environmental Symposium (TIEES-96), Karadeniz Technical University, Trabzon, Turkey, 29–31 July 1996

159 International Symposium on Metal Hydrogen Systems, Fundamentals and Applications, Les Diablerets, Switzerland, 25–30 August 1996

160 *Harnessing Hydrogen. The Key to Sustainable Transportation*, by J. S. Cannon

161 International Association for Hydrogen Energy

NUMBER 3

K. PETROV and S. SRINIVASAN 163 Low temperature removel of hydrogen sulfide from sour gas and its utilization for hydrogen and sulfur production

S. P. SINGH, S. SAMUEL, S. K. TIWARI and R. N. SINGH 171 Preparation of thin Co_3O_4 films on Ni and their electrocatalytic surface properties towards oxygen evolution

M. F. KIBRIA and M. SH. MRIDHA 179 Electrochemical studies of the nickel electrode for the oxygen evolution reaction

S. MOROOKA, S. S. KIM, S. YAN, K. KUSAKABE and M. WATANABE 183 Separation of hydrogen from an H_2–H_2O–HBr system with an SiO_2 membrane formed in macropores of an α-alumina support tube

T. BERGENE 189 The efficiency and physical principles of photolysis of water by microalgae

Y. MATSUNO, K. SUZAWA, A. TSUTSUMI and K. YOSHIDA 195 Characteristics of three-phase fluidized-bed electrodes for an alkaline fuel cell cathode

K. MURATA, K. YAMAMOTO and H. KAMEYAMA 201 Performance of a tube-wall type reactor for transforming heat energy into chemical energy efficiently

S. S. SAI RAMAN and O. N. SRIVASTAVA 207 Investigation of the synthesis and hydrogenation/dehydrogenation characteristics of the composite material Mg–x wt% $CFMmNi_5$

J. P. VANHANEN, P. D. LUND and M. T. HAGSTRÖM 213 Feasibility study of a metal hydride hydrogen store for a self-sufficient solar hydrogen energy system

M. SINGH 223 The effect of hydrogen pressure on resistivity and charge carrier concentration in FeTi and FeTi–Mn thin films

A. Z. Al-Garni 229 Comparison of H_2, CH_4 and H_2O for cooling an aerospace plane

H. R. Hinds 239 Hydrogen Energy News & Views

243 Addendum

Announcements

245 *Hydrogen Energy Progress X,* Proceedings 10th World Hydrogen Energy Conference, Cocoa Beach, FL, U.S.A., 20–24 June 1994

246 *Proceedings of the Second International Conference on New Energy Systems and Conversions*

247 The 7th Annual U.S. Hydrogen Meeting, National Hydrogen Association, 2–4 April 1996

248 Harvard University 1996 Training Workshop on Environmental Economics and Policy Analysis, 10 June–12 July 1996

249 First Trabzon International Energy and Environment Symposium (TIEES-96), Karadeniz Technical University, Trabzon, Turkey, 29–31 July 1996

250 *Harnessing Hydrogen. The Key to Sustainable Transportation*, by J. S. Cannon

251 International Association for Hydrogen Energy

NUMBER 4

S.-M. Lee, R.-J. Guo, T.-L. Tso and T.-P. Perng 253 Photoelectrochemical response and surface variation of TiO_2 electrodes irradiated with laser light

V. V. Popov, A. V. Basteev, V. V. Solovey and A. M. Prognimak 259 The effect of metal hydride activation of hydrogen and investigation of its influence on the characteristics of gas-discharge hydrogen-using energy conversion devices

A. M. Aitani 267 Processes to enhance refinery-hydrogen production

M. S. El-Deab, M. E. El-Shakre, B. E. El-Andouli and B. G. Ateya 273 Hydrogen evolution on stacked copper screen electrodes from flowing alkaline solutions

Yang Li and Yang-Tse Cheng 281 Hydrogen diffusion and solubility in palladium thin films

A. Arshinov, V. Matryonin, V. Kozin, A. Ovchinnikov, V. Popov, B. Pospelov and N. Vaskov 293 Results of the long-term testing of the 'Photon' fuel cell generator

Y. Tsujikawa and G. B. Northam 299 Effects of hydrogen active cooling on scramjet engine performance

B. Drolet, J. Gretz, D. Kluyskens, F. Sandmann and R. Wurster 305 The Euro-Québec Hydro–Hydrogen Pilot Project [EQHHPP]: demonstration phase

H. R. Hinds 317 Hydrogen Energy News & Views

321 Calendar

Announcements

323 *Hydrogen Energy Progress X*, Proceedings 10th World Hydrogen Energy Conference, Cocoa Beach, FL, U.S.A., 20–24 June 1994

324 *Proceedings of the Second International Conference on New Energy Systems and Conversion*

325 The 7th Annual U.S. Hydrogen Meeting, National Hydrogen Association, 2–4 April 1996

326 Harvard University 1996 Training Workshop on Environmental Economics and Policy Analysis, 10 June–12 July 1996

327 First Trabzon International Energy and Environment Symposium (TIEES-96), Karadeniz Technical University, Trabzon, Turkey, 29–31 July 1996

328 *Harnessing Hydrogen. The Key to Sustainable Transportation*, by J. S. Cannon

329 *New Materials for Fuel Cell Systems I.* Proceedings of the First International Symposium on New Materials for Fuel Cell Systems, Montreal, Quebec, Canada, 9–13 July 1995

330 International Symposium on Metal Hydrogen Systems, Fundamentals and Applications, Les Diablerets, Switzerland, 25–30 August 1996

331 Hydrogen '96, 11th World Hydrogen Energy Conference 23–28 June 1996, Stuttgart, Germany

332 XXIV IAHS World Housing Congress, Ankara, Turkey, 27 May–1 June 1996

333 International Association for Hydrogen Energy

NUMBER 5

J. MIYAZAKI, T. KAJIYAMA, K. MATSUMOTO, H. FUJIWARA and M. YATABE — 335 Ultra high purity hydrogen gas supply system with liquid hydrogen

R. G. BHATTACHARYYA, D. P. MANDAL, S. C. BERA and K. K. ROHATGI-MUKHERJEE — 343 Photoelectrosynthesis of dihydrogen via water-splitting using S_x^{2-} (x=1,2,3 ...) as an anolyte: a first step for a viable solar rechargeable battery

M. A. ROSEN — 349 Thermodynamic comparison of hydrogen production processes

M. SINGH and I. P. JAIN — 367 Mossbauer and positron life-time studies of FeTi and $Fe_{46}Ti_{50}Mn_4$ hydride systems

B. LUAN, N. CUI, H. J. ZHAO, H. K. LIU and S. X. DOU — 373 Effects of potassium–boron addition on the performance of titanium based hydrogen storage alloy electrodes

D. STASCHEWSKI 381 Internal humidifying of PEM fuel cells

K. PEHR 387 Aspects of safety and acceptance of LH_2 tank systems in passenger cars

A. CIANCIA, G. PEDE, M. BRIGHIGNA and V. PERRONE 397 Compressed hydrogen fuelled vehicles: reasons of a choice and developments in ENEA

T. KRATZEL, E. PANTOW and H. EICHERT 407 Modelling of hydrogen combustion: turbulent flame acceleration and detonation

V. AHUJA and R. K. GREEN 415 CO_2 removal from air for alkaline fuel cells operating with liquid hydrogen—heat exchanger development

Short Communications

J. ROTHSTEIN 423 Hydrogen, methane and carbon dioxide

J. ROTHSTEIN 425 Hydrogen and oxygen

H. R. HINDS 427 Hydrogen Energy News and Views

431 Calendar

Announcements

433 *Hydrogen Energy Progress X*, Proceedings 10th World Hydrogen Energy Conference, Cocoa Beach, FL, U.S.A., 20–24 June 1994

434 *Proceedings of the Second International Conference on New Energy Systems and Conversion*

435 Harvard University 1996 Training Workshop on Environmental Economics and Policy Analysis, 10 June–12 July 1996

436 First Trabzon International Energy and Environment Symposium (TIEES-96), Karadeniz Technical University, Trabzon, Turkey, 29–31 July 1996

437 *Harnessing Hydrogen. The Key to Sustainable Transportation*, by J. S. Cannon

438 *New Materials for Fuel Cell Systems I*. Proceedings of the First International Symposium on New Materials for Fuel Cell Systems, Montreal, Quebec, Canada, 9–13 July 1995

439 International Symposium on Metal Hydrogen Systems, Fundamentals and Applications, Les Diablerets, Switzerland, 25–30 August 1996

440 Hydrogen '96, 11th World Hydrogen Energy Conference 23–28 June 1996, Stuttgart, Germany

441 XXIV IAHS World Housing Congress, Ankara, Turkey, 27 May–1 June 1996

442 Second National Clean Energy Symposium, Istanbul, Turkey, 6–8 January 1997

443 International Association for Hydrogen Energy

NUMBER 6

A. VAN DER DRIFT, S. L. TJENG, G. J. J. BECKERS and J. BEESTEHEERDE	445	Low- NO_x hydrogen burner
T. IMOTO, T. YONESAKI, S. FUJITANI, I. YONEZU, N. HIRO, K. NASAKO and T. SAITO	451	Development of an F-class refrigeration system using hydrogen-absorbing alloys
H. NAKAMURA, Y. NAKAMURA, S. FUJITANI and I. YONEZU	457	Cycle performance of a hydrogen-absorbing $La_{0.8}Y_{0.2}Ni_{4.8}Mn_{0.2}$ alloy
F. A. LEWIS	461	Hydrogen in palladium and palladium alloys
S. CAVALLARO and S. FRENI	465	Ethanol steam reforming in a molten carbonate fuel cell. A preliminary kinetic investigation
C. S. WANG, X. H. WANG, Y. Q. LEI, C. P. CHEN and Q. D. WANG	471	The hydriding kinetics of $MlNi_5$—I. Development of the model
X. H. WANG, C. S. WANG, C. P. CHEN, Y. Q. LEI and Q. D. WANG	479	The hydriding kinetics of $MlNi_5$—II. Experimental results
S. GULTEKIN, M. A. AL-SALEH, A. S. AL-ZAKRI and K. A. A ABBAS	485	Deactivation studies on the porous Ni-gas diffusion electrode in H_2/O_2 alkaline fuel cell
L. GIORGI, M. CAREWSKA, S. SCACCIA, E. SIMONETTI, E. GIACOMETTI and R. TULLI	491	Development of molten carbonate fuel cell using novel cathode material
M. NADAL and F. BARBIR	497	Development of a hybrid fuel cell/battery powered electric vehicle
Y. JAMAL, T. WAGNER and M. L. WYSZYNSKI	507	Exhaust gas reforming of gasoline at moderate temperatures
H. VANDENBORRE and R. SIERENS	521	Greenbus: a hydrogen fuelled city bus
Technical Communication		
W. SEIFRITZ	525	Socially discounted growth processes
	531	Calendar
Announcements	533	*Hydrogen Energy Progress X,* Proceedings 10th World Hydrogen Energy Conference, Cocoa Beach, FL, U.S.A., 20–24 June 1994
	534	Hydrogen '96, 11th World Hydrogen Energy Conference, 23–28 June 1996, Stuttgart, Germany
	535	Second National Clean Energy Symposium, Istanbul, Turkey, 6–8 January 1997
	536	Fuel Cells in Transportation, 17–19 September 1996, Chicago, IL, U.S.A.
	537	Indo-US Symposium-Workshop on Remote Sensing and its Application, 6–9 October 1996, Bombay, India
	539	International Association for Hydrogen Energy

NUMBER 7

BYUNG-WOO CHOI, SU-JIN CHUNG and DONG-RYUL SHIN	541	Microstructure of PTFE and acid absorption behavior in PTFE-bonded carbon electrodes

M. M. KHADER, M. M. HANNOUT and M. S. EL-DESSOUKI 547 Catalytic effects for hydrogen photogeneration due to metallic deposition on P-GaAs

F. L. CHEN, Y. KINARI, F. SAKAMOTO, Y. NAKAYAMA and Y. SAKAMOTO 555 Hydrogen permeation through palladium-based alloy membranes in mixtures of 10% methane and ethylene in the hydrogen

K. S. RAO and R. BALASUBRAMANIAM 563 Finite element evaluation of lattice distortions around hydrogen occupied interstitial sites in vanadium and niobium

A. BORRUTO and F. MARANI 571 Hydrogen–steel interaction: relationship between variations of mechanical properties of AISI 9840 steel and hydrogen content

H. KRONBERGER 577 The influence of silicon and boron on the electrochemical behaviour of AB_5-hydrides

L. D. D. HARVEY 583 Solar–hydrogen electricity generation and global CO_2 emission reduction

K. JORGENSEN 597 Hydrogen in vans and light duty trucks in Denmark

B. MAHR, U. ESSERS, M. BRIEM and A. STERNER 607 New test bench for the examination of high-power hydrogen engines

P. J. SEBASTIAN, M. MARTINEZ, D. EAPEN, O. SOLORZA and O. SAVADOGO 613 Hydrogen energy and fuel cells: a recent R&D program in Mexico

H. S. YI, S. J. LEE and E. S. KIM 617 Performance evaluation and emission characteristics of in-cylinder injection type hydrogen fueled engine

G. A. KARIM, I. WIERZBA and Y. AL-ALOUSI 625 Methane–hydrogen mixtures as fuels

633 Calendar

Announcements

635 *Hydrogen Energy Progress X,* Proceedings 10th World Hydrogen Energy Conference, Cocoa Beach, FL, U.S.A., 20–24 June 1994

636 Hydrogen '96, 11th World Hydrogen Energy Conference, 23–28 June 1996, Stuttgart, Germany

637 Second National Clean Energy Symposium, Istanbul, Turkey, 6–8 January 1997

638 Fuel Cells in Transportation, 17–19 September 1996, Chicago, IL, U.S.A.

639 Indo-US Symposium-Workshop on Remote Sensing and its Application, 6–9 October 1996, Bombay, India

641 International Association for Hydrogen Energy

NUMBER 8

H. A. F. WERNER and R. BAUER 643 Photolytic degradation of aqueous hydrogen sulphide with simultaneous hydrogen production using visible light

W.-K. HU, Y.-S. ZHANG, D.-Y. SONG and P.-W. SHEN 651 Electrochemical hydrogen storage property of amorphous and crystalline Ml–Ni alloy films

M. A. AL-SALEH, S. GULTEKIN, A. S. AL-ZAKRI and A. A. A. KHAN — 657 — Steady state performance of copper impregnated Ni/PTFE gas diffusion electrode in alkaline fuel cell

Y. MATSUNO, A. TSUTSUMI and K. YOSHIDA — 663 — Electrode performance of fixed and fluidized bed electrodes for a molten carbonate fuel cell anode

J. C. AMPHLETT, R. F. MANN and B. A. PEPPLEY — 673 — On board hydrogen purification for steam reformation/PEM fuel cell vehicle power plants

PH. VERMEIREN, W. ADRIANSENS and R. LEYSEN — 679 — Zirfon®: a new separator for Ni–H_2 batteries and alkaline fuel cells

T. KUMAKURA, S. KAN, K. HIRAOKA and M. IKAME — 685 — Characteristics of stoichiometric H_2–O_2 combustion in water with premixing and diffusion burners

M. ABDULHADI and M. AL-GARNI — 695 — The development of a fuel cell stack electronic simulator for enhanced safety and reliability during test and training

L. M. DAS — 703 — Hydrogen–oxygen reaction mechanism and its implication to hydrogen engine combustion

K. YAMANE, S. NAKAMURA, T. NOSSET and S. FURUHAMA — 717 — A study on a liquid hydrogen pump with a self-clearance-adjustment structure

725 Calendar

Announcements

727 *Hydrogen Energy Progress X,* Proceedings 10th World Hydrogen Energy Conference, Cocoa Beach, FL, U.S.A., 20–24 June 1994

728 Second National Clean Energy Symposium, Istanbul, Turkey, 6–8 January 1997

729 Fuel Cells in Transportation, 17–19 September 1996, Chicago, IL, U.S.A.

730 Indo-US Symposium-Workshop on Remote Sensing and its Applications, 6–9 October 1996, Bombay, India

731 International Association for Hydrogen Energy

NUMBER 9

SOO-GUEN LEE, KI-YOUNG LEE, TAE-GYU KIM, ZIN-HYUNG LEE and JAI-YOUNG LEE — 733 — Mathematical model for the dynamic P-C-T curves of the $MmNi_{4.6}Al_{0.2}Fe_{0.2}V_{0.03}$ alloy in a tubular reactor

S. FUKADA, H. MINATO and M. NISHIKAWA — 741 — Recovery of hydrogen isotopes from inert gas mixtures with a titanium particle bed

S. ZHUIYKOV — 749 — Hydrogen sensor based on a new type of proton conductive ceramic

J. A. GARCIA, L. M. DOROJKINE, A. MANDELIS and J. S. WALLACE — 761 — Thermophysical response of a solid-state thermal-wave pyroelectric-film sensor to natural gas and methane

J. F. FERNÁNDEZ, F. CUEVAS and C. SÁNCHEZ — 765 — Surface activation and hydrogenation kinetics of Ti sponge

B. H. KANG, C. W. PARK and C. S. LEE — 769 — Dynamic behavior of heat and hydrogen transfer in a metal hydride cooling system

D. A. LANDSMAN and D. THOMPSETT 775 New Materials for Fuel Cell Systems: A report of the First International Symposium

G. A. HARDS 777 Fourth Grove Fuel Cell Symposium: From the Technical Success to the Challenges Facing Commercialisation

T. SANO, M. KOJIMA, N. HASEGAWA, M. TSUJI and Y. TAMAURA 781 Thermochemical water-splitting by a carbon-bearing Ni(II) ferrite at 300°C

L. M. DAS 789 On-board hydrogen storage systems for automotive application

I. L. KOLBENEV 801 Power plants with a vehicle-borne hydrogen generator

K. YAMANE, M. HIRUMA, T. WATANABE, T. KONDO, K. HIKINO, T. HASHIMOTO and S. FURUHAMA 807 Some performance of engine and cooling system of LH_2 refrigerator van Musashi-9

813 Calendar

Announcements

815 *Hydrogen Energy Progress X*, Proceedings 10th World Hydrogen Energy Conference, Cocoa Beach, FL, U.S.A., 20–24 June 1994

816 Second National Clean Energy Symposium, Istanbul, Turkey, 6–8 January 1997

817 Fuel Cells in Transportation, 17–19 September 1996, Chicago, IL, U.S.A.

818 Indo-US Symposium-Workshop on Remote Sensing and its Applications, 6–9 October 1996, Bombay, India

819 Chemistry, Energy and the Environment 3, 25–28 May 1997, Estoril, Portugal

820 Call for Papers: *The International Journal of Sciences and Engineering Research and Applications* (IJSE/RA)

821 International Association for Hydrogen Energy

NUMBER 10

M. R. SWAIN and M. N. SWAIN 823 Passive ventilation systems for the safe use of hydrogen

I. H. PLONSKI 837 Kinetics of active iron dissolution inhibited by adsorbed hydrogen

P. PEDRONI, G. M. MURA, G. GALLI, C. PRATESI, L. SERBOLISCA and G. GRANDI 853 The hydrogenase from the hyperthermophilic archaeon *Pyrococcus furiosus*: From basic research to possible future applications

C. U. MAIER, M. SPECHT and G. BILGER 859 Hydrogen evolution on platinum-coated p-silicon photocathodes

M. SAKURAI, E. BILGEN, A. TSUTSUMI and K. YOSHIDA 865 Adiabatic UT-3 thermochemical process for hydrogen production

M. SAKURAI, N. MIYAKE, A. TSUTSUMI and K. YOSHIDA 871 Analysis of a reaction mechanism in the UT-3 thermochemical hydrogen production cycle

H. EZAKI, T. NAMBU, M. MORINAGA, M. UDAKA and K. KAWASAKI 877 Development of low hydrogen overpotential electrodes utilizing metal ultra-fine particles

O.-T. ONSAGER, M. S. A. BROWNRIGG and R. LØDENG 883 Hydrogen production from water and CO via alkali metal formate salts

M. GENG and D. O. NORTHWOOD 887 The characteristics of the negative electrode of a nickel-metal hydride battery

F. BARBIR and T. GÓMEZ 891 Efficiency and economics of proton exchange membrane (PEM) fuel cells

H R. HINDS 903 Hydrogen Energy News and Views

907 Calendar

Announcements

909 *Hydrogen Energy Progress X*, Proceedings 10th World Hydrogen Energy Conference, Cocoa Beach, FL, U.S.A., 20–24 June 1994

910 Second National Clean Energy Symposium, Istanbul, Turkey, 6–8 January 1997

911 Fuel Cells in Transportation, 17–19 September 1996, Chicago, IL, U.S.A.

912 Indo-US Symposium-Workshop on Remote Sensing and its Applications. 6–9 October 1996, Bombay, India

913 Chemistry, Energy and the Environment 3, 25–28 May 1997, Estoril, Portugal

914 Call for Papers: *The International Journal of Sciences and Engineering Research and Applications* (IJSE/RA)

915 Call for Papers: 5th International Conference "Hydrogen Materials Science and Chemistry of Metal Hydrides", 2–8 September 1997, Yalta, Ukraine

917 International Association for Hydrogen Energy

NUMBER 11/12

SPECIAL DOUBLE ISSUE

PROCEEDINGS OF THE SELECTED PAPERS
OF THE
NATO IV INTERNATIONAL CONFERENCE
ON HYDROGEN MATERIALS SCIENCE
AND CHEMISTRY OF METAL HYDRIDES

Guest Editors:
Dmitry V. Schur and Svetlana Zaginaichenko

V. YU. KARPOV, A. M. RYSINA, V. I. SHAPOVALOV, A. P. MUKHACHEV and G. YA. OSTRIN 919 Application of hydrogenation for the refining and pulverization of metals

A. M. Rysina, V. I. Shapovalov, V. Yu. Karpov and G. Ya. Ostrin	923	Behavior of hydrogen-saturated zones in iron foils and sheets
L. K. Varga, K. Tompa, A. Lovas, J. M. Joubert and A. Percheron-Guégan	927	Maximum hydrogen storage capacity of amorphous $Ni_{1-x}Zr_x$ alloys
V. M. Sokolov and I. V. Fedorenko	931	Estimation of hydrogen solubility in liquid alloys of iron, nickel and copper
V. N. Verbetsky, R. A. Sirotina and E. A. Umerenko	935	Absorption of hydrogen by $MmNi_5$ alloys
N. I. Sorokina, D. Wlocewicz and T. Plackowcki	939	Phase transitions in Nb-H system
A. S. Andreenko, V. N. Verbetsky, S. A. Nikitin, N. S. Perov, A. A. Salamova, Yu. V. Skourski, N. V. Tristan and V. I. Jakovlev	945	Hydrogenation effect on the Curie temperatures of amorphous (Tb/Dy)-Co alloys
R. A. Andrievski, B. P. Tarasov, I. I. Korobov, N. G. Mozgina and S. P. Shilkin	949	Hydrogen absorption and electrocatalytic properties of ultrafine $LaNi_5$ powders
A. G. Aleksanyan and S. K. Dolukhanyan	955	Self-propagating high-temperature synthesis in Y-N-H systems
B. G. Skorodumov, V. N. Serebryakov, V. G. Ulanov, E. V. Zhukovska and O. A. Zhukovsky	961	Hydrogen and deuterium mass transfer and separation during hydriding–dehydriding of palladium studied by the NERD method
V. N. Fokin, Yu. I. Malov, E. E. Fokina and S. P. Shilkin	969	Study of the phase-forming features in the ZrH_2-O_2 system
B. A. Kolachev and A. A. Ilyin	975	The structural outlines of hydrogen storage alloys
S. V. Mitrokhin and V. N. Verbetsky	981	Titantium based laves phase hydrides with high dissociation pressure
T. Nietsch	985	Isothermal curves and kinetics in a metal hydride
H. G. Hakobian, Z. A. Harutyunian, S. K. Dolukhanyan, V. M. Beybutian and V. S. Shekhtman	993	Self propagating high temperature synthesis in the Mg-Ti-H_2 system
V. N. Verbetsky, S. N. Klyamkin, A. Yu. Kovriga and A. P. Bespalov	997	Hydrogen interaction with RNi_3 type intermetallic compounds at high gaseous pressure
O. Alexeeva, V. Sumarokov and A. Zakharov	1001	Interaction of magnetron sputtered $PrNi_5$ films with hydrogen
A. F. Prisevok, G. Y. Beliaev, I. Yu. Kipnis and A. V. Timofeev	1005	Mechanism of metal and alloy wearing in hydrogen-containing media
Y. Sakamoto, M. Ura, T. Hisamoto and T. B. Flanagan	1009	Thermodynamics of hydrogen absorption by Pd-Sb and Pd-Bi alloys
Y. Sakamoto, F. L. Chen, Y. Kinari and F. Sakamoto	1017	Effect of carbon monoxide on hydrogen permeation in some palladium-based alloy membranes
Y. Sakamoto, H. Tanaka, F. A. Lewis, X. Q. Tong and K. Kandasamy	1025	"Uphill" hydrogen diffusion effects of hydrogen interstitial strain gradients in palladium and palladium alloys
L. A. Izhvanov, A. I. Solovey, V. P. Frolov and Yu. I. Shanin	1033	Metal hydride heat pump—new type of heat converter
J. Tóth, J. Garaguly, K. Tompa, A. Lovas and L. K. Varga	1039	Hydrogen uptake monitored by resistance change in amorphous $Zr_{33}Ni_{67}$ alloy

S. E. KULKOVA, O. N. MURYZHNIKOVA and K. A. BEKETOV	1041	Electron and positron characteristics of group IV metal dihydrides
T. BRATANICH, S. SOLONIN and V. SKOROKHOD	1049	Hydrogen sorption peculiarities of mechanically activated intermetallic TiFe and TiFe-$MmNi_5$($LaNi_5$) mixtures
A. I. IVANOVSKY, V. I. KOLOSOV, M. V. LOTOTSKY, V. V. SOLOVEY, YU. F. SHMAL'KO and L. A. KENNEDY	1053	Metal hydride thermosorption compressors with improved dynamic characteristics
YU. F. SHMAL'KO, YE. V. KLOCHKO and M. V. LOTOTSKY	1057	Influence of isotopic effect on the shift of the ionization potentials of hydrogen desorbed from the metal hydride surface
V. D. DOBROVOLSKY, S. N. YENDRZHEEVSKAYA, A. K. SINELNICHENKO, V. V. SKOROKHOD and O. YU. KHYZHUN	1061	Analysis of the surface condition of $Ti_4Fe_2O_x$
Z. A. MATYSINA, S. YU. ZAGINAICHENKO, D. V. SERYI and D. V. SCHUR	1065	Hydrogen solubility in alloys of A15 structure
S. YU. ZAGINAICHENKO, Z. A. MATYSINA and D. V. SCHUR	1073	The influence of nitrogen, oxygen, carbon, boron, silicon and phosphorus on hydrogen solubility in crystals
Z. A. MATYSINA, S. YU. ZAGINAICHENKO and D. V. SCHUR	1085	Hydrogen solubility in alloys under pressure
V. G. TKACHENKO, B. G. STRONGIN, I. N. MAKSIMCHUK, V. V. FRIEZEL, V. P. GRECHKO and S. P. LIKHTAROVICH	1091	Peculiarities of solid solution decay of hydride-forming and non-hydride-forming systems with close-packed crystal structure
V. I. TREFILOV, I. A. MOROZOV, R. A. MOROZOVA, S. V. SATANIN and D. Z. YURCHENKO	1097	Effect of hydrogen in improving purity of WC and AlN powders
V. I. TREFILOV, I. I. TIMOFEEVA, L. I. KLOCHKOV, I. A. MOROZOV and R. A. MOROZOVA	1101	Effects of temperature change and hydrogen content on titanium hydride crystal lattice volume
V. G. TKACHENKO, L. I. KOLESNIK, I. N. MAKSIMCHUK and V. V. SHKLOVER	1105	Dislocation mechanism of hydrogen embrittlement of metals and alloys with hcp and fcc crystal structure
T. BRATANICH, S. SOLONIN, V. PETRISCHEV and V. SKOROKHOD	1115	Dilatation investigation of porous intermetallic samples during reversible hydrogenation
D. V. SCHUR, S. YU. ZAGINAICHENKO, V. M. ADEJEV, V. B. VOITOVICH, A. A. LYASHENKO and V. I. TREFILOV	1121	Phase transformations in titanium hydrides
V. A. DOROSHENKO, A. I. ZELENINA and L. L. POPENKO	1125	Investigation of catalytic activity of hydrides in the desulphurisation reactions of liquid hydrocarbon fuels
K. B. ISAYEV and D. V. SCHUR	1129	Study of thermophysical properties of a metal–hydrogen system
	1133	Calendar
Announcements	1135	*Hydrogen Energy Progress XI,* Proceedings 11th World Hydrogen Energy Conference, Stuttgart, Germany, 23–28 June 1996
	1136	Second National Clean Energy Symposium, Istanbul, Turkey, 6–8 January 1997

1137 Chemistry, Energy and the Environment 3, 25–28 May 1997, Estoril, Portugal

1138 International Symposium on Multiphase Flow ISMF '97, Beijing, China, 5–7 October 1997

1139 The 7th International Energy Conference and Exhibition, Energex '98, Manama, Bahrain, 19–21 November 1998

1140 Call for Papers: *The International Journal of Sciences and Engineering Research and Applications* (IJSE/RA)

1141 Call for Papers: 5th International Conference "Hydrogen Materials Science and Chemistry of Metal Hydrides" 2–8 September 1997, Yalta, Ukraine

1143 International Association for Hydrogen Energy